

LITERATURE OF MELTING-POINT OF PLATINUM.

- Violle. 'Comptes Rendus,' vol. 85, p. 543, and vol. 92, p. 866, 1881, gives 1775° and 1779° C. as determinations made by his calorimetric method.
- Holborn and Wien. 'Wied. Annalen,' vol. 47, p. 107, 1892, and vol. 56, p. 360, by thermo-electric method obtain 1780°.
- Nernst. 'Physikalische Zeitschrift,' vol. 4, p. 733, 1903, and 'Wied. Ann. Beiblätter,' vol. 25, p. 686. Obtains by an optical method 1782° as melting-point of platinum in iridium tube furnace.
- Older determinations by Becquerel, Van der Weyde, etc., vary between 1400° and 2200° C.
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*The Atomic Weight of Chlorine: an Attempt to Determine the
Equivalent of Chlorine by Direct Burning with Hydrogen.*

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(Abstract.)

Although the atomic weight of chlorine has been determined by Stas and other chemists with extraordinary care, nevertheless owing to the very indirect methods hitherto used in making the comparison between chlorine and hydrogen, it is possible that a constant error may occur in some link of the long chain of connecting ratios. To join up the open ends of the chain by a direct comparison between chlorine and hydrogen, if it could be done with reasonable accuracy, would serve not only to detect any such systematic error, but would permit the accidental errors to be distributed and prevent their accumulation at the unconnected end. According to Professor F. W. Clarke the accumulated "probable error" in his recalculated value for chlorine amounts to ± 0.0048 ; the probable error of the mean of our nine determinations is less than ± 0.002 .

It was at the suggestion of Professor E. W. Morley, of Cleveland, U.S.A., that we have attempted this direct comparison by determining the weight of hydrogen which burns in a known weight of chlorine.

Our method was briefly as follows:—

Chlorine prepared by the electrolysis of fused silver chloride (with purified carbon poles in a Jena glass vessel) was condensed and weighed as a liquid in a sealed glass bulb. This was attached to a vacuum "combustion globe" and the chlorine allowed to evaporate slowly into the globe. The hydrogen prepared by the electrolysis of barium hydrate solution was dried and then absorbed by palladium in a weighed vessel. The palladium, on being warmed, gave off the hydrogen, which was ignited by a spark and burnt at a jet in the

combustion globe previously filled with chlorine. The gases were regulated so as to maintain the hydrogen flame until nearly all the chlorine had been combined; then the palladium was allowed to cool and the hydrogen was turned off just before the flame died out. The hydrogen chloride, as it was formed in the flame, was dissolved by water standing in the globe, which was kept cool by ice. A little hydrogen chloride was formed by the action of the water-vapour on the chlorine in the flame, a corresponding amount of oxygen being liberated. This oxygen was determined in the analysis of the residual gases, which contained, besides traces of air, the small quantity of hydrogen which filled the capillary tube between the tap and the jet when the flame was extinguished, and any that might escape unburnt from the flame. The chlorine remaining unburnt in the globe was about 2 per cent. of that burnt. This unburnt chlorine, as gas and in solution, was determined by breaking thin glass bulbs containing potassium iodide. The residual gases having been pumped out (and any iodine vapour caught by a wash-bottle), the liberated iodine was determined by standard thiosulphate in an atmosphere of carbon dioxide. In the calculation of the unburnt chlorine the atomic weight of chlorine was assumed to be 35·195, and the atomic weight of iodine 126·015.

In each experiment we burnt between 11 and 13 litres of each gas.

The balance, by Oertling, was fixed on a stone pedestal in an underground cellar. The vibrations of the pointer were read by a telescope, Gauss' method of reversals being used. The chlorine and hydrogen bulbs were counterpoised on the balance by bulbs of the same glass and of nearly the same displacement, and the small weights employed in the weighings were reduced to a vacuum standard.

The following were the corrected weights of hydrogen and of chlorine burnt in the several experiments:—

	Hydrogen burnt, in grammes.	Chlorine burnt, in grammes.	Chlorine combined with unit weight of hydrogen.
1.	0·9993	35·1666	35·191
2.	1·0218	35·9621	35·195
3.	0·9960	35·0662	35·207
4.	1·0243	36·0403	35·185
5.	1·0060	35·4144	35·203
6.	0·9887	34·8005	35·198
7.	1·0159	35·7639	35·204
8.	1·1134	39·1736	35·184
9.	1·0132	35·6527	35·188
Mean ...			35·195 ± 0·0019

In the whole of these nine experiments 9·1786 grammes of hydrogen combined with 323·0403 grammes of chlorine, hence the equivalent weight of chlorine, calculated in mass, is 35·195.

The number we have obtained for the atomic weight of chlorine is appreciably higher than that calculated by F. W. Clarke from the previous determinations, and is slightly higher than Stas' value :—

Clarke's calculation.	Stas.	Dixon and Edgar.	
35·179	35·189	35·195	H = 1
35·447	35·457	35·463	O = 16

Since our experiments were completed we have heard that Professor T. W. Richards is engaged on a revision of Stas' work on the composition of silver chloride. G. P. Baxter quotes the value 35·467 as being obtained by Richards and Wells for the atomic weight of chlorine—a number slightly higher than ours.
